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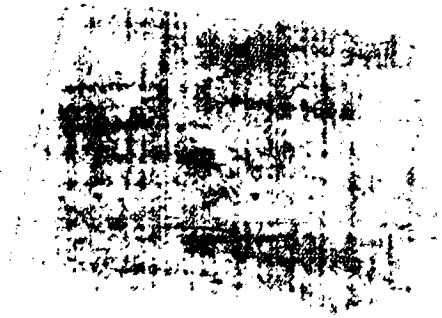
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**DESCRIPTION
AND MAINTENANCE INSTRUCTION
OF SYRENA-2 SET
(ON FIGHTER AIRCRAFTS)**

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DESCRIPTION
AND MAINTENANCE INSTRUCTION
OF "SYRENA - 2; SET
/on fighter aircrafts/.

31 pages

/3 photos included /

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I. Technical description of "Syrena - 2"

1. Destination of set.

The set serves for signalisation to the crew, that their aircraft is in the sphere of enemy aircraft radiation by radiorange finder device or radiolocation dioptr from the rear, working on about 3 cm wavelength.

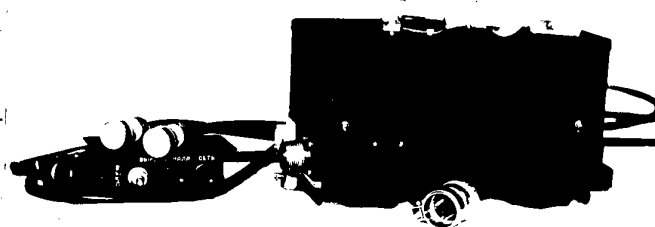


Fig. 1. General view of "Syrena-2" set.

"Syrena-2" is a detector receiver with audio signalization. It enables to define /by the change of character, and frequency of output signal/ whether the aircraft, equipped with radiating device approaches or gets away.

When the aerial of set receives the HF. signals, in the output of the receiver appear the audio signals, of constant amplitude and variable frequency, which depends on the amplitude strength of the received signal. Beside, the output signals of "Syrena-2" have modulated

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frequency, what enables to distinguish them from other signals received by the radio communication set.

2. Basic technical data.

1. Working wavelength range 3,15 ± 3,45 cm.
2. Sensitivity of set for signals coming to the detector head, with 0,5 μsec. impulse length and frequency of 1000 imp/sec in the given wavelength range, is not worse than 29 dB / 0,13 · 10⁻⁵ / and on 3,2 cm wavelength 34 dB ± 2 dB below 1 mW level.
3. The discovering angle in the rear hemisphere of aircraft equals 50 ± 80° in vertical and horizontal level.
4. Aerial polarization - rotating.
5. The output voltage amplitude is not less than 20V with 3,3 KΩ loading resistance, and not less than 30 V with 15 KΩ loading resistance.
6. Audio signalisation: The output signal from Syrena is fed to the output stage of R-800 /RSIU-3M/ receiver.
7. The supply of the station is taken from the board supply system of 27V ± 10%.
8. Power supply - 50 W.
9. Total weight /without cables/ 4,3 kg.

The set consists of following units.

1. Unit No. 1 consists of receiving aerial and detector head.
2. Unit No.2 - receiver - amplifier consists of: low frequency amplifier, driving valve, first multivibrator, generating main tone impulse, second modulating multivibrator, first and output LF signals amplifier and supply filters.
3. Unit No. 3 - control panel consisting of: signal switch, signal lamp and variable resistor for output signal level regulation.
4. Connecting cables.

3. Description of main. diagram.

The set works in the following manner:

The HF signal from the tube aerial comes to german detector

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fitted in the detector head via H₁ connection.

From the detector head the negative pulses are fed to unit No. 2 via connecting cable

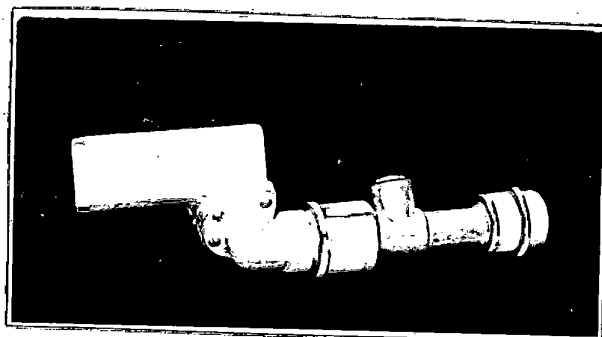


Fig. 2. Aerial with detector head

The polarizing voltage from unit No. 2 to detector is brought from R_1 R_2 voltage divider via the same cable. From cable connection the pulse is fed to the grid of first LF amplifier stage.

LF amplifier consists of seven stages - double triodes V_1 , V_2 , V_3 and left section of V_4 valves. Variable resistor R_{10} in the fourth stage of the amplifier (right section of V_2) works as a sensitivity regulation.

Resistance type of amplification is applied to the first five stages of amplifier. The choke L_1 in the anode circuit of the sixth stage of amplifier is connected in order to obtain much higher amplification.

Primary winding of Tr-1 transformer is connected in the anode circuit of the seventh stage. The negative pulses from the Tr-1 secondary winding are fed to the cathode of integrator, which consists of a diode (left section of V_7 - 6N5S valve) and integrating circuit C_{15} , R_{27} and R_{28} .

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The coming signal to the integrating circuit is a negative pulsing voltage, the value of which depends on the amplitude of received signal. The voltage proportion is equal to the received frequency of pulses.

The negative voltage from the integrating circuit is sent to the grid of driving valve (right section of V_5) A_{25} .

R_{26} and C_6 work as a filter, smoothing voltage pulsations coming to the driving valve.

Beside of that, through R_{27} and A_{28} to the grid of driving valve are coming voltage from second section of vibrator /oscillator/. This voltage is brought from R_{28} to the grid of vibrator /valve V_6 type $6X4$ /. Apart of received signal, generator produces of constant amplitude and angular frequency $0,5 \times 10^6$ c/s.

The anode current of driving valve depends on the grid voltage. R_{17} is connected into the external circuit of this valve. The change of driving valve anode current causes the change of voltage drop on this resistor, i.e. the change of working conditions of synchronization.

When no signals from radial section of antenna are received, maximum anode current flows through R_{17} and voltage drop on it. In this case valve V_5 is not working. The grid of left section of V_5 is input A_{29} .

The grid of V_5 right section is connected to the grid of left section.

Blocking of the right section of valve V_5 is connected with the defined proportion between the A_{29} and A_{25} voltages. Constant positive voltage is fed into A_{29} from a divider R_{29} to R_{30} and in this divider R_{30} the main anode current flows through R_{17} .

effect the additional voltage drop on R_{17} and A_{29} and A_{25} of driving valve with negative value. When no signal is received, potential of A_{29} is 10^{-2} V, valve does not work and with the signal A_{25} is 10^{-2} V, valve is not working, over $0,1 \times 10^{-2}$ V, valve is not working, generate interference by pulse. In this case, when received signal, the potential of A_{29} is 10^{-2} V.

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decreases, the loading time of C_{11} increases, causing decreasing of pulse frequency, generated by first multivibrator.

Pulses of second multivibrator cause additional change of driving valve anode current, what gives frequency modulation of pulses generated by first multivibrator. R_{32} gives feed back coupling.

Changing negative voltage, due to the received signal level is fed to the grid of driving valve and to the grid of last LF amplifier. It causes decreasing of amplification, decreasing of pulse amplitude in the integrator cathode circuit and also negative voltage on driving valve grid. In effect the dynamical range of interrupted oscillations in the output of set is increased.

Signals generated in the first multivibrator are amplified in two stage audio signal amplifier. To obtain the best tone of the output signals the capacitance C_{12} is connected into the circuit.

First stage of audio signals amplifier is a resistance type /right section of V_7 type 6N9S/ amplifier. and gives preamplification of audio signals; output stage works as a transformer type on 13FlS / V_8 / valve.

From the secondary winding of Tr 2 transformer the signal comes to the control panel /unit No.3/ via junction. and connecting cable.

R_{31} acts as a constant load for output valve.

From the control panel the signal goes to the wireless set R-800 - /RSU-3M/ via R_1 variable resistor.

Switch W_1 on the control panel lets to switch the signal off, if it is necessary, for not to disturb the radio-communication.

When the signal of "Syrena-2" set is switched off /switch W_1 is in "WYE" /off/ position/ the red signal lamp LN2 will light on the control panel.

Variable resistor in control panel, serves for increasing of output resistance of set, and decreasing of connection influence of set "Syrena-2" on the signal level in the audio output of R-800 set.

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This resistor should be set in such a manner, that with the distortion dumping circuit switched on in R-300 set, the signals of "Synchronizer" could break the dumping and come to the head set.

The heaters and anodes of valves are supplied from the board supply d.c. 27-V system.

The heaters of the amplifier set, are connected in series in two circuits, connected in parallel:

First circuit: valves V_1 , V_2 , V_3 , V_4 - type 6N88 and second circuit V_5 - 6N88, two parallel connected valves V_6 and V_7 type 6N98 and valve V_8 : 13Z18.

Because the filament current of valve 13-18 is bigger than filament current of valve 6N88 and connected in parallel valves 6N98, in the second filament circuit are connected resistors R_{33} , R_{34} and R_{35} , which connected in parallel have total resistance of 95 Ohms.

The switching "ON" of the set is done by the automatic switch AZS-5 which gives the supply voltage to set No.2 and control panel, set No.3. After switching on, the green signal lamp LNI on the control panel should light.



Fig. 3. Control panel /Unit No. 3/

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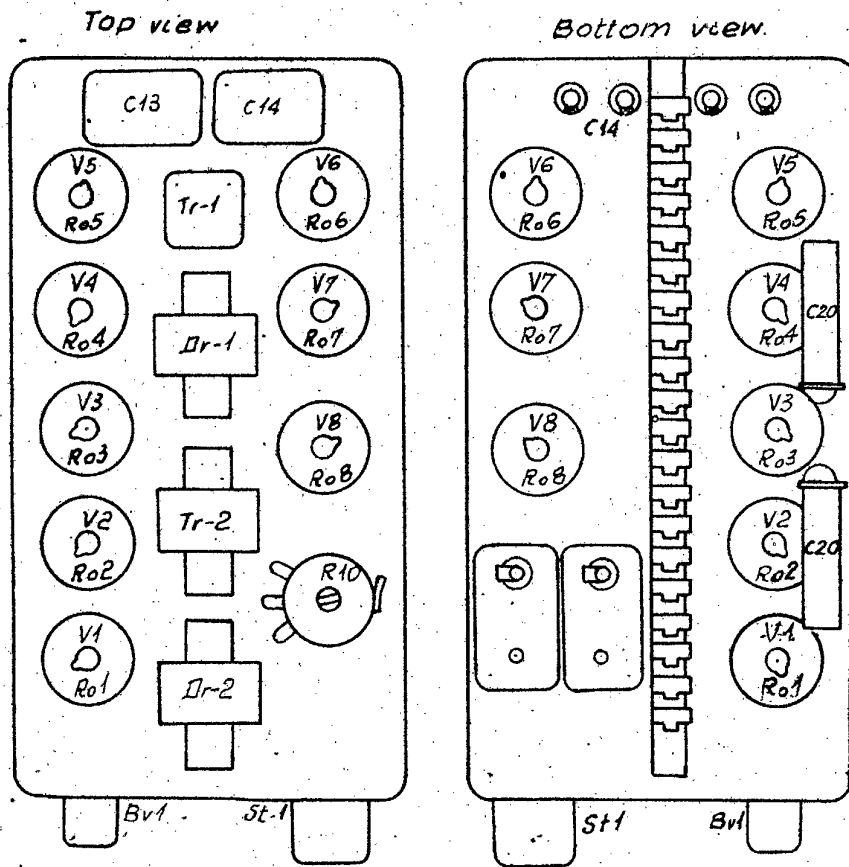


Fig. 4. Displacement diagram of main items in unit No. 2 of "System-2"

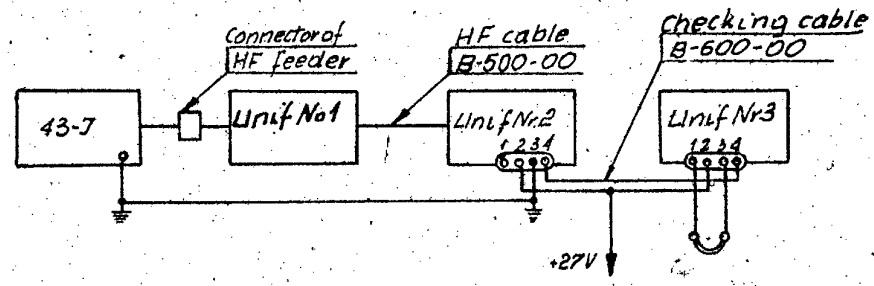


Fig. 5. Checking block diagram of cables

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The anode circuits of No.2 unit are supplied via filter, which consists of a choke Dk1 and capacitors C_{19} and C_{20} . Filament circuits are supplied via filter of Dk2 and C_{18} .

4. Transformers and chokes winding data.

Name	Type and diameter of wire	No. of turns	Resistivity of winding, about/
Induction coil	PEE-0,12	670	25
Choke Dk1	PEE-0,2	2100	$130 \pm 20\%$
" - Dk2	PEE-0,64	250	$1,5 \pm 10\%$
Transformer Tr 1.			
a/primary winding	PEE-0,07	2780	$740 \pm 10\%$
b/secondary winding	PEE-0,07	2780	$980 \pm 10\%$
Transformer Tr 2			
a/primary winding	PEE-0,16	1200	$100 \pm 20\%$
b/secondary winding	PEE-0,16	1700	$200 \pm 20\%$

5. Construction particularness.

No.2 unit is covered with varnish cr. 460 for preventing the unit against the humidity.

Any maintenance and valve changing should be done in the workshop only.

6. Station checking and sensitivity regulation.

The tuning of set is done in arrangement shown on Fig. 5. The following instruments are necessary for checking and tuning:

1. Signal generator type 43-1 /or radar tester type 31-1M and pulse generator type 26-1/
2. Tester type TT-1 or avometer AVO-5.
3. Oscillograph or pulse voltmeter.

The aerial of they should be connected to the signal generator type 43-1, with attached to the station. spare parts items, HF connector.

Generator should be modulated with pulses of 0,5 μ sec.

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Checking and tuning should be carried on in 3 - 5 min. after switching on.

Generator 43-1 should be set up on 3,2 cm wave and dumping circuit on 34 dB. The audio signals, should be heard in the head set. The sensitivity regulator $/R_{10}/$ should be set for maximum sensitivity.

If there is no signal - it means that the set is damaged or has too low sensitivity.

In this case, first of all, the detector should be checked and the value of prepolarization current of detector; TT-1 tester or AWO-5, connected between the pin of HF cable from unit No.2 and its earth should indicate a current of $120 \pm 170 \mu A$.

Detector head is disconnected from unit No.2

Then HF cable and unit No.2 should be checked according to the wiring and functional diagram.

To set the sensitivity to the wanted level, signal generator 43-1 should be set to 3,2 cm wave and its dumping circuit set to 34 dB. The variable resistor sensitivity regulation should be turned until rare, interrupted signals will be heard in the headphones. In this position the potentiometer rod should be fixed with the special fixing device. Next, the sensitivity on other points of a range, should be checked.

When, with this signal level of generator $/34dB/$ and with the minimum of sensitivity set up, the signals will not disappear it means that the set is damaged and most probably, the cause of it, is a damage of V_4 valve in No.2 unit.

Signal output level should not depend on the level of incoming signal and its frequency should slowly decrease according to increase of incoming signal.

Audio signals should be frequency modulated with the frequency of 0,5 - 2 c/sec. No modulation may be caused by the failure in modulation multivibrator circuit $/V_6$ in unit No.2.

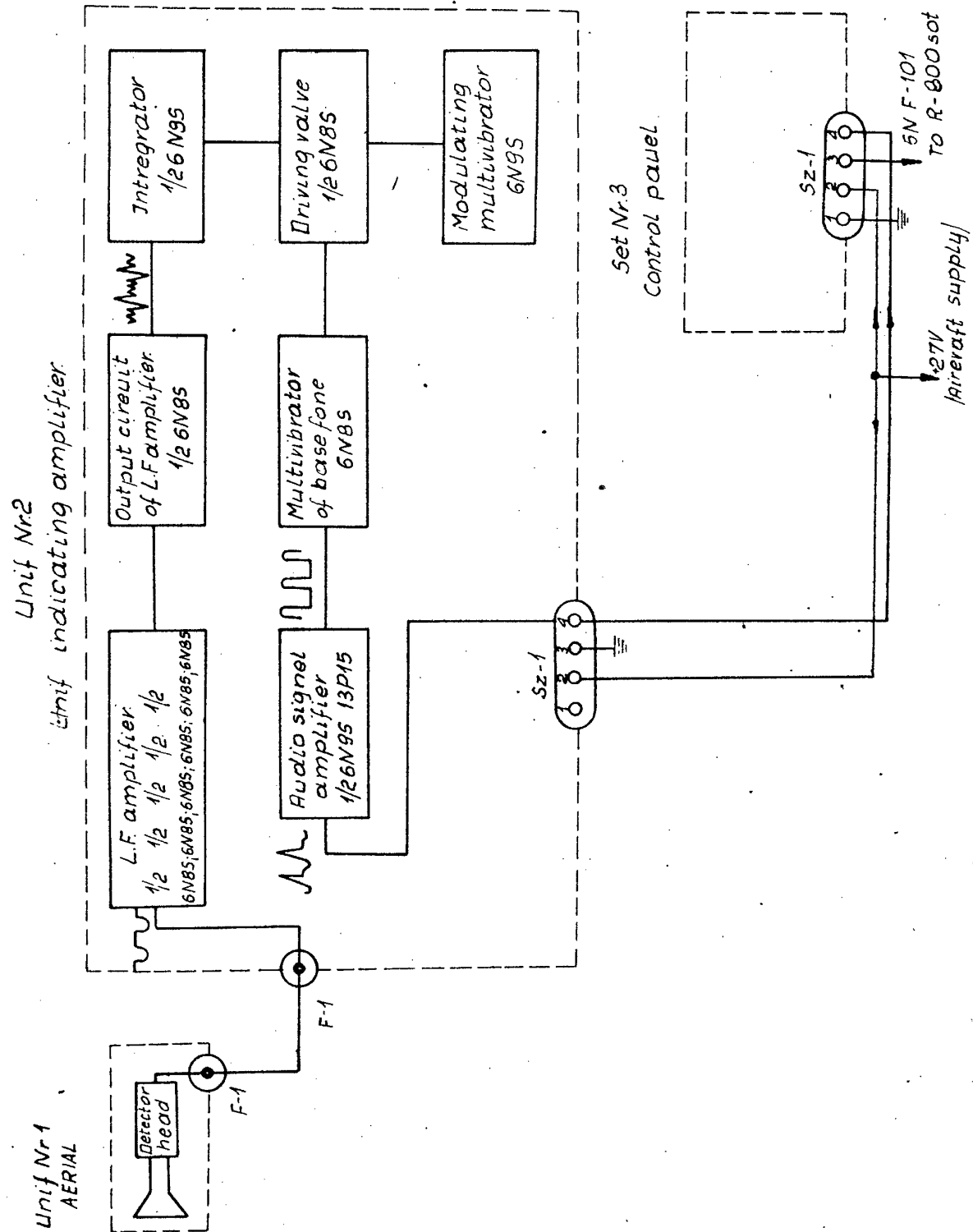
When there is no input signal, the set should not work. For checking this, the generator should be switched off, or its dumping circuit set to about 50-60 dB and then the work of set should be checked for 5 minutes. During this test

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there should be no signals in the headset.

The checking of set before each flight. should be done with the help of special buzzer attached to each five sets. If the working buzzer is placed near the aerial in the 20 - 30 cm distance, the audio signals should be heard in the headset.

Attention:

The sensitivity regulation should only be carried on, with the signal generator type 43-I or radar tester type 31-IM.

Maintenance and replacement of used valves can only be done in the maintenance workshop.

For discovering damages, in the varnish covered No.2 unit, the sharp pins can be used for connection the oscillograph or any instrument. After repairing the points of connection and changed items should be covered with varnish EN.460 according to the instruction.

Preparing to work and regulation of the buzzer.

For checking the sets before the flight in the aircrafts, the buzzer, /Fig. B-400-00/ radiating the field of spark discharge of high frequency is used.

The buzzer is supplied from pocket lamp battery, or from accumulator of 4V.

For preparation the buzzer to work, open the back cover, put the battery in, check the contacts of it with the contacts of lamp and close up the cover.

Switch the buzzer on by pushing and turning the switching knob to "WZACZ" /on/ position.

The clear buzz should be heard.

If there is no buzz, open the front cover and apply the regulation by turning ^{till} strong buzz is heard.

When there is no battery the 4V accumulator should be connected to the sockets marked $\pm$ 4V. situated on the side wall of the buzzer cover.

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Servicing manual of "Syrena - 2" set.

I. Preface

This instruction describes the preparation for use the "Syrena-2" set on ground, the way of instructing the pilots about the use in air and precautions, that appert, of this set. Use, the pilot should be still very watchfull in observing the area around, so as there was no "Syrena-2" on aircraft.

Before using this station in air, the pilots should be very well instructed and specially acquainted with chapters IV and V.

II. Short acknowledgement about "Syrena-2" station.

"Syrena-2" station is used in air to show the pilot that his plane is in the beam of radio range finder rays or of radar diopter, fitted on enemy aircraft and working on 3 cm waveband.

The station consists of detector receiver with valve amplifier and audio signalization.

The warning signals, generated by the station, are delivered to the input of low frequency amplifier, of the R-800 communication set and then to the pilots headset.

When there are no pulse signals in the input of "Syrena-2" station, there are also no audio signals in the output.

When the aircraft finds itself in the beam of enemy aircraft radiation, the pilot can hear the audio signal, which tone depends on the strength of the radiation, and on the distance from enemy aircraft.

Input signals of small amplitude give in output of the high interrupted tone.

Medium amplitude will cause the tone of alternating frequency, and big amplitude pulses give low tone and little change in frequency, or quite constant frequency.

According to the change of tone of warning signals the pilot can estimate whether the enemy aircraft is approaching or flying away.

The sensitivity of 34 dB gives the range of discovering the

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radio distance meter, working on 3 cm band, about 5 to 6 km. From this distance up to 4 km, the pilot will hear interrupted signals of high tone.

Decrease of the distance up to 4 : 2 km will cause the change in the signal for continuous and alternating frequency. On farther decrease of distance up to 2 km and less, cause for continuous tone.

In the works the sensitivity is set up to 74 dB.

In case, when enemy pilot, knowing about the use of "Cyrena-2" sets on our aircraft, will switch the HF supply to his transmitter at very small distance, it may be necessary to set the sensitivity to 29 : 23 dB. This sensitivity decrease the distance up to 2.5 : 3 km.

With this sensitivity the continuous tone of constant frequency will appear at the distance from enemy aircraft of 1000 meters and at the longer distance than 1000 m the station will give the signals of alternating or interrupted frequency. Clear demarcation of signals character, at the 1000 m. distance: nearer - continuous, farther - alternating or interrupted frequency, may be more comfortable for pilots, using "Cyrena-2" station in case of switching on the enemy radio range finder at small distance.

In this case the appearance of continuous signals will signalize to the pilot, that he should undertake rapid action to avoid exact aiming.

The "Cyrena-2" set for fighter aircrafts consists of following units:

1. Aerial with detector head /unit No 1/
2. Amplifier - indicator unit /unit No. 2/
3. Control panel /unit No. 3/
4. Connecting cables.

III. Connection of "Cyrena-2" set to R-800 radio set

/KSIU - 3M/

The "Cyrena-2" signals are delivered to the L.F. amplifier of R-800 set from control panel via 1 - 101 connection.

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After amplification they come to the pilots head set. To eliminate the influence, of switching on the "Syrena-2" signals, on the proper work of R-300, the special variable resistor is fitted in the control panel. To set up properly this resistor, the R-300 should be switched on as well as "Syrena-2", and the working buzzer placed near the Syrena aerial. The noise buzzer in R-300 should be switched on. Now, turn to the right, the knob of variable resistor in the control panel until the clear and strong signals will be heard. The switch on the control panel /unit No. 3/ let us to switch the Syrena signals off, during radio communication.

IV. Special instructions for flying personnel.

The pilot should never stop watching his air area, even his aircraft is equipped with Syrena-2 set.

The station is not warning the pilot about the enemy aircraft approach when he has no radio range finder switched on, working on 3 cm band.

The flying personnel using Syrena-2, should always remember that enemy can fitt to his equipment the HT. supply switch, and then the enemy pilot can switch his radio range finder at short distance from your aircraft (1500 - 2000 m/). If the enemy fighter, having such a switch will make a use of it and will switch the radio range finder at a very short distance from the plane equipped with Syrena-2 set, it may be the case that the warning signal will appear when the enemy will be at the distance of 1000 meters or less and the pilot will not have the chance to avoid the enemy gunfire.

In such a case the Syrena signals will warn the pilot to late, before the enemy action.

It is very difficult to estimate sufficiently exact period of time from switching the HT to the radio range finder by enemy pilot to complete synchronization of the bioptr with radio range finder and exact aiming. We can say that the minimal possible ^{time} obtain, from the time of switching on to opening the effective gunfire will be shortened to few seconds.

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The pilots using the Syrena-2 sets should remember about it and should react for enemy tactics. If described above cases, will be noticed, it is very important to let all flying personnel know of it, because it means that enemy knows about using the Syrena-2 sets on our aircrafts and applies the tactics to decrease the effect of them.

The flying personnel is most interested in keeping the idea of this equipment very secret.

It is forbidden in any case to send out by radio any news about Syrena-2 set.

It is quite plain that decreasing of effect of Syrena-2 set, by switching the HF supply just before an attack may only take place during the daylight operations.

At night, such an idea will take no place as an enemy fighter will be afraid of losing the object of his attack from sight area.

V. Flying personnel training on ground in servicing and use of "Syrena-2" set:

The most effective use of "Syrena-2" set by pilots will be obtained when they will be well trained before in the class room or on aircraft with working "Syrena-2" set.

The training of pilots should be arranged in the class room outfitted with radio set R-800 /ACIO-3M/, "Syrena-2" connected to the R-800 receiver, signal generator type 43-I, or radar tester type 31-Ia and generator 26-I.

The aerial of "Syrena-2" set should be listed at the distance of 10-15 cm from the output feeder of generator 43-I.

After the switching the "Syrena-2" set, wireless set and generator on, the warning signals will be heard in the headsets, connected to the wireless set, similar to the signals of approaching or dismissing enemy aircraft fitted with working radio range finder.

The change of warning signals can be done by manipulation of generator 43 I damping device.

During the training it should be pointed out to the flying

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personnel, about the possibility of rapid appearance of warning signals coming from short distance of about 1000 - 1500 m. Such a case may take place when the enemy fighter is flying by and not radiating the beam in our direction, but will make the rapid turn in to our direction and the our aircraft will find itself in the area of strong radiation field and in effect in our headset continuous warning signals appear, what means that the distance from enemy fighter is very short. The case of appearance of continuous warning signals of low tone, can also take place, when the enemy pilot will switch the R2 supply to his radio range finder at the distance of effective gunfire. The flying personnel should be also trained in the use of switching off the "Syrena-2" signals with the switch placed on the control panel.

VI. The stimulation possibilities of "Syrena-2" set by the radiation from radiolocation bomber diopeters working on 3 cm band and strong ground radiolocation sets.

The bombers are fitted with radiolocation bombing diopeters, working on 3 cm band.

In case of combined operations the radiation from the aerial of bombing diopeter, rotating with the speed of 14 rev./min. can stimulate the "Syrena-2" set and in the pilots headset can be heard loud shortlasting signals caused by above mentioned diopeter.

These signals will appear at intervals of 2 sec.

"Syrena-2" set is fitted with weakening device for shortlasting pulses, so the warning signals caused by diopeter aerial will be much weaker than the signals coming from fixed radio range finder aerial.

With the sensitivity of 34 dB of Syrena-2 set the signals from bomber diopeter can be heard from the distance of 5 km and if the fighter with Syrena-2 is flying beneath the bomber and in front of it, that its Syrena-2 aerial is directed

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the sound the horn.

With the sensitivity of System 100, the signal from the horn might be visible from the distance of 3000 ft. In daylight when the visibility is better, the signal will be visible from a distance of 10000 ft. At night, the signal will be visible from a distance of 1000 ft.

It should be noted that at night, when the radio signal is mostly used, the distance is in "day" mode. It will be quite easily distinguishable from the signal of "System 100" and in other cases will be easily distinguishable from the signal of "System 100" and in other cases will be easily distinguishable from the signal of "System 100".

In case of emergency, the signal will be visible from the radio location. The signal will be visible from the radio location. The signal will be visible from the radio location. The signal will be visible from the radio location.

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TECHNICAL SERVICING INSTRUCTION OF "SYRENA-2" STATION

1. Checking of "Syrena-2" station before and after the flight.

The special buzzer, attached to each five sets, is used for checking the "Syrena-2" set before and after the flight.

The set should be supplied with 27 V $\pm$ 10% from the board supply system or from accumulator.

a. The way of checking the set in aircraft.

1. Switch the wireless communication set to receive.
2. Put the automatic switch AZ-5 on. The "Syrena-2" should start working and the green lamp on the panel control will light.
3. Put the No 3 unit switch to "Włącz" /on/ position.

Remark: The switch on No. 3 unit serves for switching off the output of "Syrena-2" to the R-800 receiver. When this switch is in off position the red lamp should light.

4. After 3 - 5 minutes from switching "Syrena-2" on the switched on buzzer should be placed in front of the aerial. The warning signal should then be heard in the headset and its tone will change according to the change of the distance between the buzzer and aerial.

In the case that the work of "Syrena-2" set, during the buzzer test, is not normal, or when the buzzer is not on, and there are no signals on 3 cm band but the station gives warning signals, the detector should be changed.

Remark:

The H.F. circuits of "Syrena-2" set, have wide band pass filters, and that is why, the set can start working from various sources of radiation if they are strong enough and sufficiently near.

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To change the detector in aircraft, the detector head should be unscrewed, but the aerial should be left in.

After the change the detector head should be connected to aerial and to HF cable, then the sensitivity should be tuned to the buzzer.

The tuning should be practically compared to the sensitivity of other aircrafts checked with the same buzzer i.e. that set should work the same with the buzzer at the same distance from the aerial in all aircrafts.

It should be remembered that the buzzer output power can alter due to the battery state and to the contact breaker /vibrating spring/. When the battery is discharged and the contacts burned the radiation will be weaker and then the distance from the buzzer to the aerial should be decreased for proper set work. That is because the buzzer should not be switched on too often and for long time.

The set at which the detector head has been changed, should be checked by the tester type 43-I by the first occasion. The sensitivity should be 34 dB below 1 mW level at 3.2 cm wavelength, 0.5 μ sec. pulse and repeating frequency 1000 c/s.

Warning.

The checking of "Cyrena-2" set with tester 43-I or radar tester 31-II should always be done by well trained specialist, who very well knows the servicing of both testers.

II. The way of sensitivity regulation of "Cyrena-2" set.

The range of "Cyrena-2" set at the sensitivity of 34 dB /below 1 mW/ set up in the factory, and by radiation of aircraft, fitted with radio range finder working on 3 cm band, is 5 - 6 km.

The sensitivity set up after detector change should be no more than 36 dB or less according to working conditions.

Setting up more than 36 dB is forbidden because it may cause selfoscillations and in result the damage of the station.

When the station is properly tuned to 33 - 34 dB it will warn the pilot about the approach of enemy fighter with the radio range finder, working on the 3 cm wave band, the

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Warning signals will change in following manner:

At the distance 5 - 6 km - interrupted signals
from 4 km to 2000-2500 m - signals
of alternating frequency and from 2000 - 2500 m to complete
approach - continuous low tone.

III. 25 ± 5 hours inspection on every 10 days

/if aircraft does not fly/

1. Check the fitting of aerial, amplifier - indicator set and cable connections for security.
2. Check the cables that they do not rub the fuselage items at the vibrations.
3. Check the work of the station.

IV. 50 ± 5 hours inspection or after 30 ± 5 days if the aircraft does not fly.

1. Do the work enlisted in chapter III.
2. The 50 hours inspection must be done in the workshop.
The complete set should be removed from aircraft for this inspection and the spare one fitted on. It is forbidden to interchange the separate units from different sets.
3. For 50 hours inspection and checking, remove the seal and cover of the amplification unit.
Check carefully the valves and mountage, check the aerial and detector head. Remove the discovered faults.
Replace the cover of unit No. 2 and screw up the fixing screws.

Warning.

- a/ The shaft of the variable resistor in No 2 set should not be turned without the real necessity.
- b/ It is forbidden to change the connections or displacement of wires inside the unit.
1. Check carefully the varnish cover of unit No 2.

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Discovered cracking should be immediately covered with varnish No 360, which belongs to the spare parts.

5. Check the sensitivity of the station with generator type 43-I or radar tester type 31-IM.

For this check, the aerial of the station should be connected to generator 43-I /31-IM/ with special connector, attached to spare parts.

One end of this connector should be connected to generator and the other put on the aerial of "Syrena-2" set in such a manner that the tube of the aerial should tightly touch the 43-I tester.

Remark:

During the measurement, it should be taken in to consideration, that the connector gives the dumping of HF signals of $1,5 \text{ dB} \pm 0,5 \text{ dB}$.

Additional error of measurement in effect of difference in wave factor equals $\pm 1 \text{ dB}$. In this case general error of sensitivity measurement equals $\pm 1,5 \text{ dB}$.

The way of sensitivity measurement of "Syrena-2" set with generator type 43 - I

1. Connect the units of "Syrena-2" set with cable, /added to spare parts/ and to 27 V d.c. supply
2. Connect the headset.
3. Switch on and calibrate signal generator type 43-I according to attached instruction.
Set up the frequency of 9370 Mc/s, 0,5 μ sec. pulse and pulse frequency of 1000 c.
4. Connect the "Syrena-2" aerial with input connection of generator 43-I.
5. Switch on the supply to "Syrena-2" and warm the filaments up for 5 - 7 min.
6. Decrease the dumping of generator 43-I until the single warning signals will appear in the head set. The generator dumping should then show about 34 dB below 1 m.w. level.

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7. In case, when sensitivity is different to 34 dB, /more or less/ the wanted sensitivity should be set up with R_{10} resistor in No. 2 unit.

The shaft of this resistor is brought outside the unit and adjusted to the screwdriver.

After the R_{10} setting, its shaft should be accurately fixed with the blocking nut and sealed.

8. After the sensitivity regulation, switch off the supply.

V. 100 ± 5 hours inspection of after 3 month ± 10 days
if aircraft is not flying.

100 hours inspection is the same as 50 hours inspection.

VI. Possible defects of "Syrena-2" set and the ways of
removal them.

Because the valves and all the items of unit No 2 are working at lowered anode voltage $17 \text{ V} \pm 10\%$ and the thermal and electric conditions are very good the unit is sufficiently sure in work.

Less dependable part of "Syrena-2" set is a crystal placed in the detector head /unit No 1/.

Pos.	Fault symptom	Fault cause	The way of removal
1	The green lamp on control panel lights, when the signal is switched off the red lamp lights but there is no audio signal.	No 17 V supply in No 2 unit	Check the 17 V supply circuit of No 2 unit and remove the discovered fault.
2	No green light and no audio signal.	The failure in supply system of the set.	Find and remove the failure
3	The set switched on, the buzzer switched on but no audio signal	1. Bad contact in 17 cable or damaged cable 2. Crystal is -	1. Check the cable contacts and remove the failure. 2. Change the crystal detector.

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Pos.	Fault symptom	Fault cause	The way of removal
		b/Unit No 2 does not work	c/Check unit No.2 and change the damaged items
4	Too small sensitivity of the station	a/No bias voltage on crystal detector. his voltage comes from No 2 unit /resistors R ₁ or R ₂ are damaged. b/sensitivity of crystal detector decreased. c/One of the valves in No.2 set is damaged	Change the damaged resistor b/Change crystal detector c/Change the damaged valve.
5	No signals at the aerial input but the audio signals are in the headset.	Abnormal work of aerial detector	Change the crystal detector.
6	Amplifying unit does not work and the lamp does not light	The filament of one of the valves is burned out	Check the voltage in the filament pins of each valve holder. The voltage of burned out valve should be 27 V. Change the valve in the workshop
a/	V ₁ , V ₂ , V ₃ , V ₄	a/ V ₁ , V ₂ , V ₃ , V ₄	a/V ₁ , V ₂ , V ₃ , V ₄
b/	V ₅ , V ₆ , V ₇ , V ₈	b/ V ₅ , V ₆ , V ₇ , V ₈	b/V ₅ , V ₆ , V ₇ , V ₈

Beside all these failures, during the use of the set may appear the worsening of the work of crystal detectors /DCS-3 or DCS-4/. It can be observed by the increase of hum coming from these detectors.

Detectors with increased level of inner distortions, caused by bad contact between the spring and crystal may, in some cases cause to arise single signals in form of whistle or

hum during the opening of aerodynamical brakes when the aircraft is diving and on the ground when one will gently knock on the detector section of aerial or even on the aerial cover.

Such deterioration of detector work has no influence on sensitivity of station and also does not decrease of the range, but it is a sign that the complete damage of detector may be soon expected.

According to this, the detector D3S-3 or D3S-4 with the increased level of inner distortions should be changed for new ones.

Remark: After the any change in the unit No. 2 /valves or other items/ the varnish cover should be renewed. All the replaced items should be accurately covered with varnish No 460. The valve pins, base and sockets should also be covered with the same varnish, as well as the glass bulbs up to 10 mm from the base. The space between the valve base and socket should be exactly filled with the varnish.

VII. The packing of "Syrena-2" station for transport

The "Syrena-2" station is transported and stored in the special case provided for five complete sets.

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Specification to the main diagram

Design	Name	Type	Value	Fig.No.
1	2	3	4	5
Unit No 1				
Detector	EG-S3 or EG-S4			
Unit No 2				
V ₁	Valve	6N8C		
V ₂	"	6N8C		
V ₃	"	6N8C		
V ₄	"	6N8S		
V ₆	"	6N8S		
V ₇	"	6N8S		
V ₈	"	13F1C		
R ₁	Resistor	MET-0,5-180 Kom-II-E	180 Kohm $\pm 10\%$ -0,5W	
R ₂	"	MET-0,5-24 Kom-II-E	24 Kohm $\pm 10\%$ -0,5W	
R ₃	"	MET-0,5-180 Kom-II-E	180 Kohm $\pm 10\%$ -0,5W	
R ₄	"	MET-0,5-9,1 Kom-II	9,1 Kohm $\pm 10\%$ -0,5W	
R ₅	"	MET-0,5-9,1 Kom-II	9,1 Kohm $\pm 10\%$ -0,5W	
R ₆	"	MET-0,5-180 Kom-II-E	180 Kohm $\pm 10\%$ -0,5W	
R ₇	"	MET-0,5-180 Kom-II-E	180 Kohm $\pm 10\%$ -0,5W	
R ₈	"	MET-0,5-9,1 Kom-I-	9,1 Kohm $\pm 10\%$ -0,5W	
R ₉	"	MET-0,5-91 Kom-II	9,1 Kohm $\pm 10\%$ -0,5W	
R ₁₀	"	JP-1-16-22-13	22 Kohm; 1W	
R ₁₁	"	MET-0,5-180 Kom-II-E	180 Kohm $\pm 10\%$ -0,5W	
R ₁₂	"	MET-0,5-170 Kom-II-E	170 Kohm $\pm 10\%$ -0,5W	
R ₁₃	"	MET-0,5-180 Kom-II-E	180 Kohm $\pm 10\%$ -0,5W	

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R ₁₄	Resistor	MLT-C,5-9,1 Kom-II	9,1 Kohm $\pm 10\%$ -0,5W
R ₁₅	"	MIT-O,5-24-Kom-II-B	24 Kohm $\pm 10\%$ -0,5W
R ₁₆	"	MLT-O,5-91 Kom-II-B	91 Kohm $\pm 10\%$ -0,5W
R ₁₇	"	MIT-O,5-390 Kom-II-B	390 Kohm $\pm 10\%$ -0,5W
R ₁₈	"	MLT-O,5-82 Kom-II-B	82 Kohm $\pm 10\%$ -0,5W
R ₁₉	"	MLT-O,5-9,1 Kom-II	9,1 Kohm $\pm 10\%$ -0,5W
R ₂₀	"	MLT-O,5-6,8 Kom-II	6,8 Kohm $\pm 10\%$ -0,5W
R ₂₁	"	MLT-O,5-390 Kom-II-B	390 Kohm $\pm 10\%$ -0,5W
R ₂₂	"	MLT-O,5-32 Kom-II-B	32 Kohm $\pm 10\%$ -0,5W
R ₂₃	"	MIT-O,5-82 Kom-II-B	82 Kohm $\pm 10\%$ -0,5W
R ₂₅	"	MLT-O,5-390 Kom-II-B	390 Kohm $\pm 10\%$ -0,5W
R ₂₅	"	MLT-O,5-82 Kom-II-B	32 Kohm $\pm 10\%$ -0,5W
R ₂₇	"	MIT-O,5-2 Kom-II-B	2 Kohm $\pm 10\%$ -0,5W
R ₂₈	"	MLT-O,5-92 Kom-II-B	92 Kohm $\pm 10\%$ -0,5W
R ₂₉	"	MLT-O,5-390-Kom-II-B	390 Kohm $\pm 10\%$ -0,5W
R ₃₀	"	"	"
R ₃₁	"	MIT-O,5-9,1 Kom-II	9,1 Kohm $\pm 10\%$ -0,5W
R ₃₂	"	MIT-O,5-1,2 Kom-II-B	1,2 Kohm $\pm 10\%$ -0,5W
R ₃₃	"	MLT-2-240-Om-II-I	240 Ohm $\pm 1\%$ -2W
R ₃₄	"	"	"
R ₃₅	"	MLT-2-270 Om-II	270 Ohm $\pm 10\%$ -2W
R ₃₆	"	MLT-O,5-47 Kom-II-B	47 Kohm $\pm 10\%$ -0,5W
R ₃₇	"	MLT-O,5-3,9 Kom-II	3,9 Kohm $\pm 10\%$ -0,5W
C ₁	Condenser	KTC-I-200-1000-II	1000 pF $\pm 10\%$
C ₂	"	KSO-1-250-B-200-II	200 pF $\pm 10\%$
C ₃	"	KSO-1-250-B-200-B	100 pF $\pm 10\%$
C ₄	"	KPG-1-200-3300-II	3300 pF $\pm 10\%$
C ₅	"	KSO-1-250-B-200-II	200 pF $\pm 10\%$

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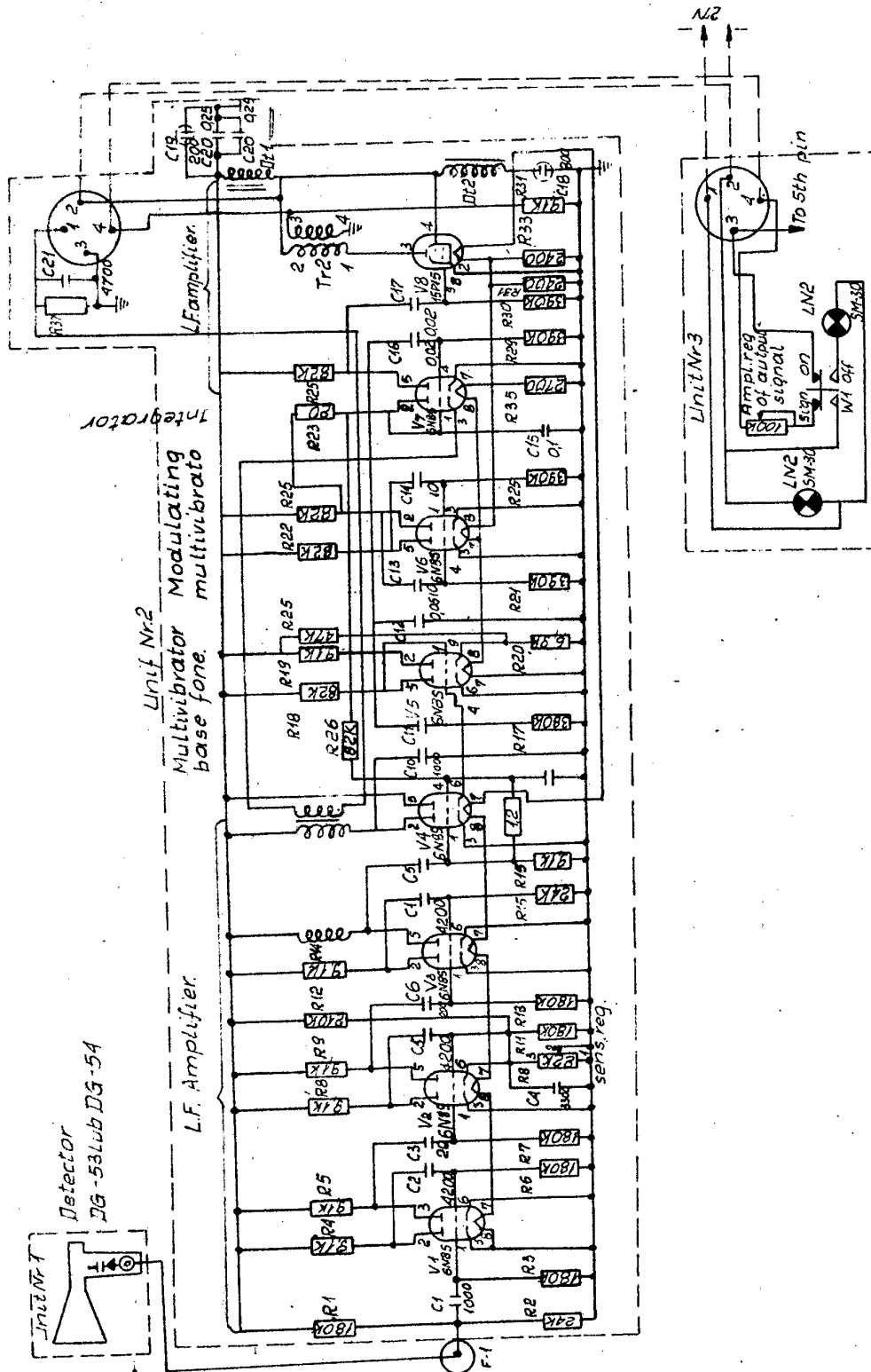
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Voltage chart of 40: 2 unit.

Valve	No of pin	Voltage Value	Measuring conditions	Valve	No of pin	Voltage Value	Measuring conditions
V_1	1	- 0,3V		V_6	1	-5+-3V	The instrument pointer will alter as the multivibrator is working to the given values
	2	12V			2	12+-14V	
	4	- 0,3V			4	-1+-1,7V	
	5	12V			5	12+-14V	
	7	3,3V			7	12,6V	
V_2	1	- 0,3V	It depends on R_{10} position	V_7	2	6,3V	
	2	12V			1	-2,5+-15V	
	4	0+-0,3V			2	-2,5+-15V	
	5	12+-15V			4	1,1+-0,3V	
	7	12,6V			5	20+-13V	
V_3	1	- 0,3V		V_8	7	12,6V	The different values of voltage depends on strong or weak signals.
	2	12V			2	12,6V	
	4	- 0,3V			3	24V	
	5	26V			4	27V	
	7	12,6V			5	-1,7+-0,7V	
V_4	1	- 0,3V	With max amplification R_{10} in extreme right pos. and with the change of signal from strong to weak	V_9	7	24V	
	4	-1,3+-0,3V					
	6	12+-0,5V					
	2	25V					
	5	26V					
V_5	1	9V	With multi vibrator working	V_{10}	1	- 0,3V	With multi vibrator working
	2	17V			2	25,5V	
	3	10V			3	3,3V	
	4	1,2V			4	0,6V	
	5	9V			5	- 0,3V	
V_6	1	- 0,3V		V_{11}	8	0,3V	
	2	25,5V					
	3	3,3V					
	4	0,6V					
	5	- 0,3V					

1. The measuring should be carried on with the 27 V supplying voltage
2. The values obtained during the measurement may differ to the given in chart of $\pm 10\%$

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